ARE MY PINES READY TO THIN?

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Determining the appropriate time to thin a pine stand can be difficult. There is no definitive answer as to when a pine stand should be thinned. However, consideration of five criteria – tree diameter, stand density, tree heights, natural pruning, and growth rates – can help landowners and foresters make this crucial decision.

Tree Diameter

Diameter at breast height (DBH) is the diameter of the tree stem 4-1/4 feet above the ground. This measurement can be taken with a tree scale stick *(see Figure 1.)* or with a diameter measuring tape.

DBH is important because trees must be at least 5 inches DBH to be sold for pulpwood. Trees smaller than 5 inches DBH are not "merchantable" and typically will not be cut. Consequently, thinning your stand before the majority of the trees are 5 inches DBH or larger may result in

"high grading." This occurs when the only trees harvested are the larger, faster-growing trees. Rather than harvesting these dominant trees, you should leave them as "crop trees." When your trees are all 4 inches DBH or larger, you can harvest the slower-growing, smaller, less vigorous trees and provide your crop trees more room to grow.

Stand Density

Stand density is determined by both the size (DBH) of the trees and the total number of trees per acre (TPA). As the average size of the tree increases, the number of trees the site is capable of supporting decreases. For example, at the
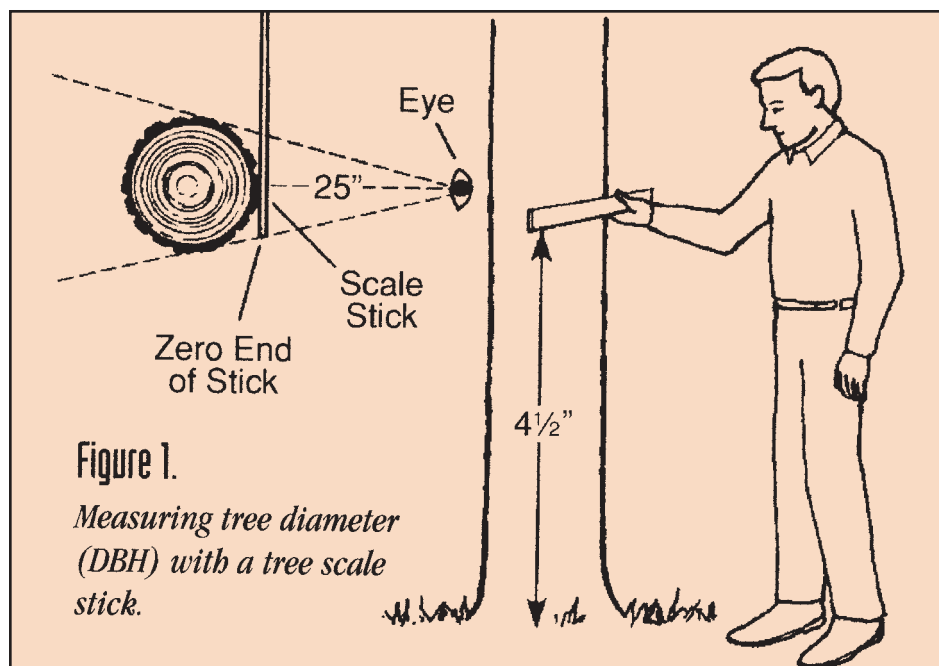
Figure 1.

Measuring tree diameter (DBH) with a tree scale stick.

Eye

25"

Scale Stick

Zero End of Stick

4½"

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Plot No.	Tree DBH							Total DBH	No. of Trees
1	6	7	5	7				25	4
2	7	8	6	6	7	7		41	6
3	7	6	6	5	5	7		36	6
4	6	6	6	7	6	6	7	44	7
5	7	7	7	6	6	6	5	44	7
6	5	5	5	6	5	6		32	6
7	7	7	7	7				28	4
8	7	7	6	6	5			31	5
9	7	6	6	5	5			29	5
10	7	7	7					21	3
						TOTALS		331	53

Average Trees per acre = 53 (total # trees) x 100/10 = 530

Average DBH = 331 (total sum of DBH's) / 53 (total # trees) = 6.2"

of 11 feet, 9-5/16 inches. This is the radius of a 1/100-acre circle. Using either a tree scale stick or a tree diameter measurement tape, go through the following steps:

Step 1 - Walk through your plantation and take 10 random 1/100-acre plots evenly distributed over the plantation. Record the number of trees and the DBH of each tree on each plot. *(See chart at left and page 30.)*

Step 2 - Take the sum of the diameters of all trees on each plot, and then take the sum of the total number of trees on each plot.

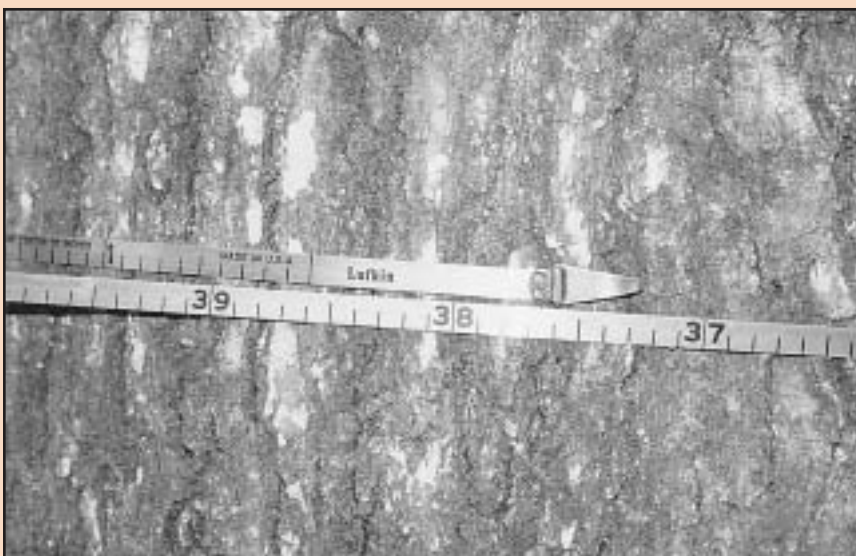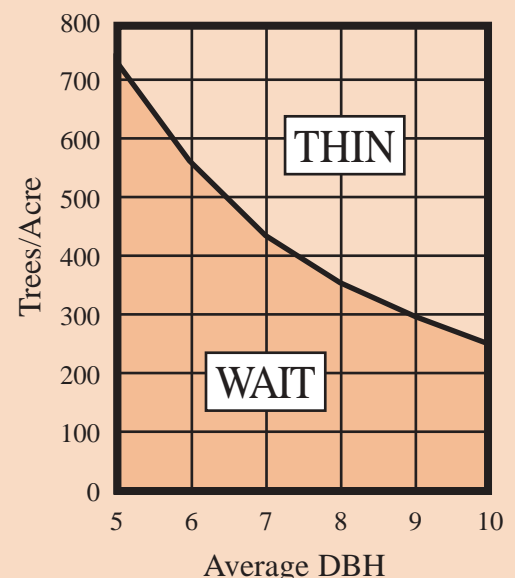*Step 3* - Add the number of trees counted on all the plots.

Step 4 - Calculate the trees per acre (TPA) as the total trees counted on all plots divided by the number of plots (10) times 100.

Step 5 - Calculate the average DBH (the sum of all DBHs divided by the number of trees.)

Step 6 – Locate the average TPA and the average DBH of your plantation on the Thinning Graph below.

time of tree planting, a site may easily support 600 or more tree seedlings per acre. However, as tree diameters and crowns increase in size, the amount of nutrients, soil moisture, and sunlight required for optimum growth also increases. Eventually, the stand density (TPA & DBH) becomes too high to maintain good growth rates. The goal of thinning is to reduce stand density by removing the slow growing, lower quality trees, thus maintaining rapid growth on the straight, healthy, vigorous, and evenly-spaced crop trees.

There is a simple method to determine when the stand density dictates thinning. Cut a piece of string, stick, or bamboo to a length

THINNING GRAPH
Thin/wait decision based on stand density (TPA & DBH)

Measuring tree diameter at breast height (DBH) with a diameter measuring tape.

Using the example of 530 TPA and 6.2-inch DBH, the graph indicates that we should wait to thin.

Although TPA and DBH are the two primary factors that determine the need to thin, several other factors should be considered. When your stand density indicates the trees are in need of thinning, you should then evaluate tree heights, natural pruning, and growth rate factors to determine *exactly* when to thin.

Tree Heights

Trees should be at least 40 feet tall for a plantation to be economically thinned. Harvesting operations today use tree-length log trucks to haul trees from the woods to the mill. If the trees are less than 40 feet, there may be increased costs associated with hauling.

Natural Pruning

Since pines do not tolerate shade, their branches die from the ground up as trees become crowded and overtopped. These dead limbs over time will shed or fall off the trees. This is known as natural pruning and results in a tree of higher value with a clean stem and a well-developed crown.

Natural dying of the lower branches to a minimum height of 18 feet should be

The approximate age of a tree can be determined with an increment borer.

accomplished before a pine plantation is thinned. If there are live green limbs less than 18 feet from the ground, thinning the stand could lower tree quality.

If thinned, these green limbs will be exposed to sunlight and will continue to grow. Tree growth needs to be concentrated on the main pole of the tree, supported by a well-developed crown. Thinning too early can result in growing larger lower limbs, which eventually lowers the quality of the logs, inhibits diameter growth, and reduces the value of the tree.

Growth Rates

The main objective of thinning a pine stand is to maintain vigor and growth rates on the best trees, known as "crop" trees. Therefore when growth rates decline, it is time to thin. The ideal situation is for the crop trees to continue growing at a steady and vigorous rate. Take a growth increment core from trees to determine growth rates of your dominant and co-dominant trees. Calculate the percent annual growth by using increment boring and several other tree measurements. This annual growth rate is the final criteria you should use to determine if your plantation is ready to thin.

For example, your plantation may have DBH, heights, natural pruning, and density levels to justify thinning. However, if trees are

still growing at an annual rate of 12 percent, it may be wise to postpone thinning. Why would you want to harvest half your trees when they are still growing at 12 percent?

Landowners should decide what growth rate is acceptable to them. Growth rates will very from site to site, depending on the soil site index. Some landowners may decide that as long as the trees are growing at the prime interest rate, let them grow. Other landowners may have predetermined rates of return they expect the trees to produce. An acceptable factor could range between 5 percent and 15 percent, depending on individual landowner objectives.

Are My Pine Trees Ready to Thin?

As a landowner, you can evaluate your pine plantation by using the five criteria described above and by using the Thinning Graph. Landowners may determine criteria such as DBH, TPA, tree heights, and natural pruning, but growth rates normally require the assistance of a professional forester.

Remember, the first thinning of your pine plantation may be the most important activity conducted and will impact the future growth and economics of your pine plantation for many years. Using the services of a professional forester in evaluating your pine plantation is highly recommended. ♠

Note: A sample "Field Worksheet" is included on page 30.

Number of Trees Per Cord

Diameter Breast High (Inches)	Trees Per Cord of 128 Cubic Ft. (Number)
5	46
6	21
7	15
8	10
9	8
10	6
11	5
12	4

Note: This is an approximate table for rough determination.

(Continued from page 15)

FIELD WORKSHEET

Plot. No.	Tree DBH									Total DBH	No. of Trees
									Totals		

Average Trees per acre = _____ (total # trees) x 100/10 = _____

Average DBH = _____ (total sum of DBH's) / _____ (total # Trees) = _____